LITTLE BEAR RIVER

HYDROLOGIC UNIT

PLAN

1992

Prepared as a Coordinated Resource Management Plan
by
USDA Soil Conservation Service
USU Cooperative Extension Service
USDA Agriculture Stabilization & Conservation Service
Utah Department of Agriculture
in cooperation with the
Little Bear River Hydrologic Unit
Technical Advisory Committee
Blacksmith Fork Soil Conservation District
and the
Bear River Resource Conservation & Development Council

marital status or handicap.

AUTHORITY

In 1989 the Blacksmith Fork Soil Conservation District (SCD), and the Bear River Resource Conservation and Development Council (RC&D), approved and submitted to USDA's Soil Conservation Service, an application for Hydrologic Unit Area (HUA) planning funds for the Little Bear River (LBR) Watershed. The application was prepared with assistance from the local Soil Conservation Service (SCS), USU Extension Service (ES), Utah Department of Agriculture (UDA) and the Utah Department of Health. Approval of that request was granted in 1990.

Under guidance of the SCD Board of Supervisors and the RC&D Council with cooperation of various federal, state, and local agencies the Little Bear River Steering Committee (LBRSC), and the Little Bear River Technical Advisory Committee (LBRTAC) were organized. The LBRSC is the decision making body and provides leadership for the project. The LBRTAC provides technical input, direction, and assistance in developing the project plan.

The LBRHUA Plan was prepared as part of Utah's effort to comply with the 1987 Federal Clean Water Act, Section 319. This section gives direction for nonpoint source water pollution control. The act directs the state of Utah as well as other states to prepare an assessment of streams and water bodies to determine the nature and extent of nonpoint source pollution. It further directs the states to prepare a management plan describing strategies for control of nonpoint pollution sources. The Little Bear River is on Utah's NPS high priority list of streams that are in need of treatment to reduce nonpoint source pollution. This list is found in the document "Utah Nonpoint Source Assessment Report", completed by the Utah Department of Health.

The LBR Hydrologic Unit Plan was developed following the guidelines outlined in "Utah Coordinated Resource Management Planning Handbook and Guidelines" by Roger Banner et. al.

PREFACE

Little Bear River Hydrologic Unit Area

Appreciation is expressed to all the people who contributed to the development of this plan document. Many individuals representing a number of different federal, state and local agencies, businesses, groups, and private individuals cooperated greatly to complete this task. Participants gathered information, completed assessments and evaluations, ran computer models, analyzed data, developed charts and graphs, and prepared individual sections of the plan.

The purpose of this document is to provide guidance for development of individual treatment plans. Individual plans will spell out land treatment practices that, when implemented, will result in the desired water quality improvements.

It is anticipated that funding for implementation of this project plan and the resulting individual conservation plans, will come from various agencies of federal, state, and local governments, private sources, and from individual land owners.

CONTENTS

EXECUTIVE SUMMARY
Little Bear River Hydrologic Unit

Location Land Use and Agronomics

The Little Bear River Watershed is located in Cache County, Northern Utah. The watershed encompasses 196,432 acres and includes irrigated cropland, irrigated pasture, meadow pasture, non-irrigated cropland and pasture, and rangeland. Land use is approximately 70% range/forest/wildlife, 19% irrigated cropland, 7% dry cropland, and 4% other. Land ownership is 85% private, 11% national forest, and 4% state lands.

Land within the watershed is primarily used for livestock feed production and as grazing land for livestock and wildlife. There are approximately 36,807 acres of irrigated cropland, and 14,682 acres of nonirrigated cropland within the watershed. Crops produced in the watershed include corn, small grains, alfalfa and pasture/hayland. The remaining 144,943 acres include range, forest, waterbodies, towns, etc.

Non-Point Source Pollution Problems

This watershed has been identified as a high priority watershed in Utah, needing treatment to reduce nonpoint source pollution impacts. The most obvious source of pollution is sediment from streambank erosion along the Little Bear River channel between Porcupine and Hyrum Reservoirs and between Hyrum and Cutler Reservoirs. There are also areas in the South Fork Drainage, south of the town of Avon that have severely eroded streambanks and yield considerable amounts of sediments during spring rains and snowmelt runoff.

A second problem area includes several tributary drainages to the Little Bear River approximately four miles upstream from the Hyrum Reservoir. These small drainages are heavily impacted by intense summer convection storms and rapid snowmelt runoff. During these events high peak flows cause severe erosion of the main and tributary channels. Sediment and nutrient loading to the river system also results from road damage and cropland erosion caused by these high flows.

A third problem is created when excessive amounts of nutrients and coliform enter the system after being flushed from concentrated animal feed operations (CAFO), pasture and cropland immediately adjacent to the river. A major portion of the river corridor is used for livestock grazing and crop production.

A fourth problem develops from high phosphorous input into the reservoirs causing accelerated eutrophication. Phosphorous input occurs as water flows over excessively eroding range and cropland, primarily during spring runoff.

A fifth problem occurs along the western and southern shorelines of Hyrum Reservoir when wave action beats against the toe of highly erosive bluffs causing major sloughing, that results in sediment deposition to the reservoir.

Demographics

Approximately 12,000 people live within the hydrologic unit area. About 8,200 individuals live in the incorporated communities of Hyrum, Paradise, Wellsville, and Mendon. The remainder live in unincorporated areas.

Purpose

Objectives of this project are as follows:

a. Reduce water pollution impacts coming from cropland, pastureland, farmsteds, CAFO's and rangeland to both surface and ground waters.

b. Improve the quality of water within the Little Bear River system to improve fish and wildlife habitat, enhance the aesthetics, recreational, agricultural and municipal water quality.

c. Inform and educate all individuals associated with the project area of the need to manage the resource within the watershed in such a way as to maintain and improve water quality and water related resources.

d. Isolate water quality problem sources, monitor progress in reducing water quality impacts, determine effectiveness of treatment alternatives, and evaluate economic benefits for implementing water quality improvement activities.

Land Treatment and Best Management Practices

Planning activities, which are now in process, will spell out more clearly and precisely the methods and extent of treatment. In general bank stabilization measures will be implemented along the banks of the Little Bear River where needed. Efforts to armor the west shoreline of Hyrum Reservoir will be employed. Filter strips will be established in areas where they will be most beneficial. Rangeland will benefit from; grazing management, seeding, fencing, livestock water development and deferred grazing. Pasture treatment will include proper grazing use, fencing, livestock watering facilities, irrigation water management, seeding, and improved irrigation systems. Riparian zones and streams will benefit from drop structures, rock pools, vegetative enhance~ent, and streambank protection. Cropland improvement will include, irrigation water management, irrigation system improvements, and crop rotation. Feedlots located along the channel or tributary channels will be managed to reduce pollutants by excluding livestock from the channel and providing alternate sources of water. Also waste control practices such as installing manure storage bunkers and other animal waste control facilities will be implemented. All land treatment practices that reduce NPS pollution in the LBR HUA will have beneficial effects on the Aquatic life, fisheries, waterfowl, etc.

INTRODUCTION

Location Land Use and Agronomics

The Little Bear River Hydrologic Unit (Watershed) is located in Cache County, Northern Utah. The watershed encompasses 196,432 acres and includes irrigated cropland and pasture, non-irrigated cropland and pasture, and range. Land use is approximately 70% range/forest/wildlife, 19% irrigated cropland, 7% dry cropland, and 4% other. Land ownership is 85% private, 11% national forest, and 4% state lands (see appendix A, map 1).

Land within the watershed is primarily used for livestock feed production, grazing, and wildlife. There are 36,807 acres of irrigated cropland and pasture, and 14,682 acres of Nonirrigated cropland within the watershed (see appendix A, map 2). The remaining 144,943 acres include range, forest, waterbodies, towns, and unlabeled areas.

Non-Point Source Pollution Problems

The Little Bear River Hydrologic Unit was identified as a high priority watershed in Utah state's 319 plan needing treatment to reduce nonpoint source pollution problems. State monitoring and evaluation sites have identified a variety of problems ranging from high rates of sediment movement to exceptionally high amounts of fecal coliform due to animal waste. Domestic livestock and wildlife have unrestricted access to most of the Little Bear River system throughout the four seasons.

The primary source of pollution is sediment due to high rates of streambank erosion along the Little Bear and its tributaries (see appendix A, Map 3). Streambank erosion yields considerable amounts of sediment during spring rains and snowmelt runoff.

The flood stage events of 1983 and 1984 caused severe channel erosion due to an already unstable condition. Raw eroded areas continue to yield significant amounts of sediment and nutrients into the river system. Previous to early settlement the Little Bear River had a significantly wider floodplain. With gradual loss of the river's effective floodplain and the seasonal change of meanders, downcutting and destablized areas of the channel occurred. Many meanders in these areas, particularly between the town of Avon and the Hyrum Reservoir, are truncated against the tall bluffs. Because of this large amounts of sediment frequently discharges into the river system. The destabilization process occurs repeatedly as the river laterally migrates into the toe of the bluffs.

The second problem source of pollution comes from gully erosion in several tributary drainages to the Little Bear River. These small drainages are heavily impacted by intense summer convection storms and rapid snowmelt runoff. During these events high peak flows cause severe erosion of the main and tributary channels resulting in deep down cuts adjacent to cropland and range. Sediment and nutrient loading into the river system also results from road damage and cropland erosion caused by these high flows.

A third problem is created when excessive amounts of nutrients and coliform enter the system after being flushed from concentrated animal feed operations (CAFO), pasture and cropland located immediately adjacent to the river. A major portion of the river corridor is used for livestock grazing and crop production.

A fourth problem is high phosphorous input into the Hyrum and Cutler Reservoirs causing accelerated eutrophication of these high recreational and multi use water bodies.

A fifth problem is shoreline erosion along the western and southern shorelines of the Hyrum Reservoir. Wave action against the toe of these highly erosive bluffs, and debris acting as a pulverizing agent, encourages major sloughing of the banks. The result is the reservoir's diminished capacity and water quality. The west bank of the Hyrum Reservoir, between the dam and the spillway, is now eroded within 10 to 12 feet of a county road of major use and importance.

Demographics

Approximately 12,000 people live within the hydrologic unit area. About 8,200 individuals live in the incorporated communities of Hyrum, Paradise, Wellsville, and Mendon (see Appendix A, Map 1). The remainder live in unincorporated areas. Those living in unincorporated areas reside in lots of 1/4 acre and larger with consentrations along main roads and waterways. Generally property ownership is in lots of 5 acres or more, and large individual families are common within the watershed.

Planning Overview

The Little Bear River Hydrologic Unit Area is large. It includes 34 subwatersheds, over 50,000 acres of Cropland and well over a hundred miles of stream (see appendix A, map 4). Most all of the remaining inventories, model calibration, and planning processes have been organized and identified in the 1991 and 1992 annual plan of operation. The planning and inventory activities were directed to address scoping and technical concerns first. The watershed plan also has a Geographic Information System (GIS) database. Many of the overlays produced by the GIS have been valuable in developing accuracy in inventory, analysis, planning evaluation, acreage, lengths, and sizes in general.

Planning activities are being directed towards implementation, evaluation of monitoring sites, erosion rates, recreational opportunities and accumulating data for economic analysis and cost comparisons. The Little Bear River Hydrologic Unit Plan is directed towards implementing a holistic planning approach. Conservation, on the ground to improve water quality is a primary goal.

Objectives

The objectives of this project are as follows:

a. Reduce water pollution impacts coming from cropland, pastureland, and rangeland to both surface and ground waters.

b. Improve the quality of water within the Little Bear River system to enhance the quality of life of all users.

c. Inform and educate all individuals associated with the project area of the need to manage the resource within the watershed in such a way as to maintain and improve water quality and water related resources.

d. Isolate water quality problem sources, monitor progress in reducing water quality impacts, determine effectiveness of treatment alternatives, and evaluate economic benefits for implementing water quality improvement activities.

Public Participation & Scoping

The majority of planning activities in 1990 were focused on scoping concerns of landoperators, landowners, environmental awareness groups, government agencies with a vested interest, technical considerations, and civic leaders such as city mayor and Soil and Water Conservation Districts (See Appendix B, Chart A Response Diversity).

The SCS Project Coordinator, the Extension Water Quality Coordinator and other personnel recorded and logged requests and concerns about different kinds of problems between May of 1989 and January of 1991. These problems were categorized into specific areas such as location within the hydrologic unit, types of individuals who responded, and types of resource problems discussed. Comments were logged from sources such as public meetings, minutes, telephone calls from various interested groups to the Soil Conservation and Extension Services Field Offices, and personal contacts in the field or offices. These comments where finalized and tallied for results. Appendix B, Charts A thou H graphically summarize the various scoping concerns. Information Source, Chart B, indicates the types of contacts made between Technical Advisory Committee personnel recording concerns and various interested groups. The majority of comments were logged from public meetings, phone call inquiries and personal contacts. Chart C clearly indicates that slightly over half of the concerns expressed by all entities were directed towards problems or interest in the river. Hyrum Reservoir and McMurdie Hollow drainages were also significant. Concerns about these two drainages were repeatedly brought up over the 19 month comment logging period. Chart D is of interest because it displays the landowners/operators concerns. Notice of the total comments logged from landowners 69% were river, 7% McMurdie Hollow drainage, 7% range, and 3% cropland. It is anticipated that concerns of landowners and operators will increase as information and education programs, about water quality problems and opportunities, reach producers.

River Restoration, Chart E, is a representation of comments made by all interested groups, categorically, by reach. Appendix A map 5, PSIAC and River Classification, displays the location of these reaches within the hydrologic unit.

Charts F thru H are the recorded responses, respectively, of community leaders, environmental awareness groups, and CRMP agency personnel. There were a total of 456 recorded responses.

There were no negative comments concerning the pie chart information appendix B, charts A thru H, presented to the public on January 29, 1991.

WORKGROUP ORGANIZATION

Little Bear Hydrologic Unit Organization

In 1989 the Blacksmith Fork Soil Conservation District and Bear River Resource Conservation & Development Council organized the Little Bear River Steering Committee. The responsibility of the Little Bear River Steering Committee included program leadership and direction. This committee included community leadership, landoperators, and Little Bear River Water Users Association representatives. The Steering Committee as organized has the following representation (see appendix C, list 1 for specific information on steering committee representation)

Mendon City
Wellsville City
Paradise City
Cache County
Hyrum City
Bear River RC&D Council
Little Bear River Water User Assn.
Utah Assn. of Conservation Dist.
Blacksmith Fork SWCD
Cache Wildlife Federation
Cache County ASCS Committee
White's Trout Farm

In 1989 the Little Bear River Steering Committee established a Technical Advisory Committee (Also referred to as Technical Action Committee) for the purposes of inventorying, evaluating, and developing conservation treatment alternatives to address water quality problems (see appendix C, list 2). The Technical Advisory Committee is also responsible for providing technical expertise for implementing the approved treatment plan.

The Technical Advisory Committee, in an effort to address nonpoint source water quality concerns, provides leadership for Coordinated Resource Management Planning (CRMP) efforts of five work groups (see appendix C, chart 1). This document contains assessments and recommendations from the five work groups for improvement of water quality within the Little Bear River watershed. The five work groups are: Hydrology/Sediment/Range, Cropland, Wildlife and Recreation, Monitoring and Evaluation, and Information and Education.

Work group teamleaders are members of the Technical Advisory Committee and direct the planning and implementation efforts of each group.

The planning efforts of this Hydrologic Unit plan followed the guidelines set forth by Banner et. al., in "Utah Coordinated Resource Management and Planning Guidelines- 1989".

The Scoping and Financial Assistance section of this plan has a comprehensive description of the Little Bear River Hydrologic Unit Scoping activities.

PROBLEMS AND TREATMENT ALTERNATIVES

The problems and treatments section of this document has been subdivided into five categories; River Corridors, Rangeland, Cropland & Farmsteads, Fish & Wildlife, and Recreatione Each category is addressed below. Treatment units and alternatives are included where applicable.

River Corridors

The SCS sediment-erosion evaluation of 1990 targeted several streambank zones and specific range areas for priority treatment. Streambank erosion information from this evaluation shows the extent of sediment loading that landslides are contributing to the Little Bear River. This evaluation as well as earlier streamwalk inventories identified specific stream reaches where treatment is needed (See Appendix D, H/S/R Report).

Streamwalk inventories of 1988 and 1989 showed a variety of problems all along the Little Bear River. A list of these follows:

-headcutt mg
-lack of an adequate floodplain in erodible reaches
-lateral cutting caused by point bars and mid-channel bars
-snags within the channel
-oversized meanders
-steep eroding banks
-lack of stabilizing riparian vegetation
-oversized or leaning streamside trees
-landslides - toe erosion from stream undercutting
-unconsolidated channel and bank materials
-improperly placed concrete rubble
-streamside trash to be removed or stabilized
-waste from streamside animal concentrations
-lack of appropriate maintenance flows
-specific problems associated with bridge crossings and other high value confinements to the flood plain

For a detailed description of the problems listed see 'Channel Problem Description' in Appendix D, H/S/R Report.

Treatment For Channel Erosion

Information on stream stability found by the work group inventories was used to develop alternative solutions for channel problems. Table 1 lists the problems found along the river. Table 2 indicates the applicability of treatments for the various stream types. Table 3 indicates the potential benefit of treatments for the identified problems. An example of how to use the three tables can be found in the Appendix D, H/S/R Report.

Eight geomorphologic stream types were classified along the Little Bear River using the Rosgen method of stream classification. They are: Cl, C2, C3, C5, C6, Fl, F3, and F5 (Table 2 and the PSIAC and River Classification Map use these symbols).
The recommended treatment alternatives would be those solutions which have a high rating on table 3 and an excellent rating on table 2.

Treatment For Eroding Bluffs At Hyrum Reservoir

The eroding bluffs at Hyrum Reservoir may be treated relatively quickly and cost-effectively. The recommended treatment is to construct log cribbing at the toe of the bluffs to absorb wave action and to use dormant stock planting to revegetate side slopes.

Rangeland

The following problems have been identified on the rangeland in this watershed:

1. Range erosion and sediment yield.
2. Riparian and wetland condition.
3. Range condition.

Erosion and Sediment Yield

The Pacific Southwest Interagency Committee (PSIAC) sediment yield model was used to determine erosion from the rangeland areas.

TREATMENT UNIT 1 - (Upper Mountains):
The sediment yield rating for this unit is in the low to moderate PSIAC sediment yield classification averaging 0.20 ac-ft/mi^2 (0.60 tons/acre). This unit comprises approximately 66% of the Little Bear River watershed. The south-facing slopes of this unit are the predominant sediment producers.

The Future Without Project (FWOP) condition is not expected to change much from the present condition assuming present practices are continued. However, future logging, road building, heavy grazing, or stream bank erosion, may increase the overall sediment yield rate in the region. The Future With Project (FWP) will not change due to the present overall good rangeland condition. This unit was not considered for treatment except in a few specific cases where onsite evaluation will be needed.

TREATMENT UNITS 2A AND 2B (Salt Lake Formation):
These units have a moderate to high PSIAC sediment yield classification with a value of 1.1 ac-ft/mi^2 (3.3 tons/acre) in 2a and 0.35 ac-ft/mi^2 (1.07 tons/acre) in 2b. These units represent an area located east and west of Paradise and are situated on deposits of the Salt Lake Formation. These units are the least stable with a good portion of sediment being fed directly into the principal drainages. Landslides/sloughs along the streambanks are common in the drainages west of Paradise. The FWOP condition of unit 2b has the potential to degrade to the present condition of 2a. Unit 2a will continue to degrade.

Sediment yield in the FWOP condition will increase about 22 percent when considering units 2a and 2b (17,080 tons/yr to 20,900 tons/yr). This increase is expected to take place with continued loss of ground cover which will expose more surface area and increase runoff resulting in more rilling. Streambanks may recede further due to present debris in channels deflecting flows into stable/unstable banks and eventually causing them to slough into the channel (mostly in unit 2a). The sediment increase in unit 2b is expected to be predominantly from increased rilling due to degrading ground cover conditions.
With project action, conditions in units 2a and 2b will save approximately 15,000 tons of sediment/year (78% of the total watershed sediment savings).
Units 2a and 2b make up only 5% of the total watershed.

TREATMENT UNIT 3 - (Foothills-Salt Lake Formation):

This unit has a low sediment yield of .15 acre-feet/mi^2 (.46 tons/acre). Maple trees are dominant in this unit, especially on the north slopes of the ridges. The south-facing slopes typically have a whitish/gray soil surface with less vegetative cover. Sediment delivery to the Little Bear River is low due to the dense riparian and understory cover over a large percentage of the unit.

The FWOP condition may include increased sediment yield from the present 9,090 tons/yr. to 12,220 tons/year, an increase of about 34 percent. Project action will save 3,490 tons/yr or about 30 percent of the FWOP sediment yield. This estimate is optimistic since the unit is presently considered to be in the low erosion category.

TREATMENT UNITS 4A AND 4B - (Slopewash/Colluvium):
These units have a low sediment yield of .13 ac-ft/mi^2 (.40 tons/acre/yr). These units have indications of historic erosion problems with concentrated flow paths about 2' wide and 1' deep in spots. Presently this unit is stable with good ground cover of about 85-95 percent.

The FWOP condition may be decreased ground cover due to increased grazing which may activate old gullies and rills, especially in 4a.

Project action could help this area by decreasing the potential sediment yield by approximately 25 percent from 2,600 tons to about 1,950 tons, a savings of 660 tons/year. This is an optimistic sediment savings since it is considered to be stable in the present condition. The FWP would represent only 4 percent of the total range land savings.

Rangeland Treatment Alternatives

Three rangeland alternatives are considered in this plan:

Alternative 1 - Future Without Project (FWOP) Action
Alternative 2 - Improved Management
Alternative 3 - Full Treatment

It is anticipated that during implementation each of these alternatives or a combination of them may be applied to different ownership units within the watershed.

Alternative 1 - Future Without Project

Without some type of project action to improve range condition and/or management, most treatment units are expected to continue to deteriorate or remain the same. Riparian areas will continue to deteriorate and some will be lost due to streambank erosion and/or lowering of watertables. Water quality will continue to be impaired by sediment from rangelands and streambanks. Range forage production is expected to decrease or continue at the present level.

Alternative 2 - Improved Management

This alternative consists of accelerated implementation of conservation practices to facilitate proper management of the range and riparian resources. No vegetative manipulation would be done under this alternative. Grazing systems would be designed to minimize conflicts between domestic livestock, wildlife, recreational use, and watershed management. This alternative would apply to all treatment units in the watershed.

Components of this alternative consist of:

Practice	Unit	Cost/Unit	Cost
Fencing - Standard	40 (mile)	$4000	$160,000
Water Developments	39 (each)	$1500	$85,000
Planned Grazing System	62600 (Acres)	N/A	*
Proper Grazing Use	62600 (Acres)	N/A	*
Riparian Management	170 (Acres)	N/A/	*

***** Labor or time costs. The more intensive the management, the higher the costs.

Estimated Total Cost: **$** 245,000

Effects: This alternative would achieve the following results:

Improve range condition on 62604 acres.
Reduce average annual soil erosion by 2 tons/acre.
Reduce sediment yield by 21264 tons per year.
Improve watershed groundcover by 10 percent.
Improve water quality.
Improvement in condition of riparian areas.
Improve wildlife habitat.

Alternative 3: Full treatment

This alternative consists of implementation of conservation practices to facilitate proper resource management and accelerate rehabilitation of degraded rangeland and riparian areas.

Conservation practices would be designed and installed to achieve project objectives while minimizing conflicts between potential resource uses.

This alternative would apply to treatment units 2a, 2b, 3 and 4b.

Components of this alternative consists of:

Practices	**Units**	**Cost/Unit**	**Total Cost**
Fencing - Standard	25 (miles)	$4000	$100,000
Water Developments	22 (each)	$1500	$ 33,000
Weed and Brush Control	7200 (acres)	$20	$144,000
Range Seeding	1500 (acres)	$30	$ 45,000
Riparian Plantings	12100 (feet)	$3	$ 36,300
Gully Erosion Control	50 (units)	$500	$ 25,000
Planned Grazing System	21000 (acres)	N/A	N/A
Proper Grazing Use	21000 (acres)	N/A	N/A
Riparian Management	110 (acres)	N/A	N/A
Deferred Grazing	8700 (acres)	N/A	N/A

Estimated Cost: $ 383,300

Effects - This alternative would achieve the following results:

Improve range condition on 21000 acres.
Reduce average annual soil erosion by 2.6 tons/acre.
Reduce sediment yield by 22800 tons per year.
Increase available forage yield by 0.16 AUM'S/acre.
Improve watershed groundcover by 30 percent.
Improve water quality.
Improve condition of riparian areas.
Improve wildlife habitat.

Recommended Alternative

To best achieve the objectives of the Little Bear River project it is recommended Alternative 3 - Full Treatment be implemented in treatment units 2a, 2b, 3, and 4b. It is also recommended that Alternative 2 - Improved Management be implemented in treatment units 1 and 4a.

Cropland and Farmsteads

Problems and Opportunities

The list below represents resource concerns in the cropland region of the Little Bear River Hydrologic Unit Area related to soil, water, plants, animals and air.

A. SOIL

1.Erosion
a. Sheet and rill
b. concentrated flow
c. Classic gullies
d. Stream bank
e. Irrigation induced
f. Soil Mass movement
g. Road banks

2. Condition
a. Tilth
b. Compaction
c. Contaminants, chemical (potential)
d. Contaminants, organic (potential)
e. Contaminants, fertilizers (potential)

3. Deposition
a. Onsite damage
b. Offsite damage
c. Onsite Safety

B. WATER

1. Quantity
   a. Excess, runoff/flooding
   b. Excess, subsurface
   c. Inadequate outlets
   d. Water management, irrigation
   e. Water management, non-irrigated
   f. Restricted capacity, deposition onsite
   g. Restricted capacity, deposition offsite
   h. Restricted capacity, water bodies
2. Quality
   a. Groundwater contaminants, pesticides
   b. Groundwater contaminants, nutrients and organics
   c. Groundwater contaminants, salinity
   d. Groundwater contaminants, pathogens
   e. Surface contaminants, pesticides
   f. surface contaminants, nutrients and organics
   g. Surface contaminants, turbidity
   h. Surface contaminants, low dissolved oxygen
   i. Surface contaminants, salinity
   j. Surface contaminants, temperature

3. AIR

4. Quality
   a. Airborne safety, onsite
   b. Airborne safety, offsite
   c. Airborne health, onsite
   d. Airborne odors

D. PLANTS

1. Suitability
a. Adaptability
b. Suitability

2. Condition
a. Productivity
b. Health and vigor

3. Management
a. Establishment, growth, harvest
b. Nutrient management
c. Pest Management

E. ANIMALS

1. Habitat
   a. Food
   b. Cover and shelter
   c. Water

2. Management
   1. Population and balance
   b. animal health

Treatment Alternatives

Treatment alternatives are groups of practices necessary to address general resource concerns in the treatment unit. The selected treatment units are: Irrigated cropland, Dry cropland, Pasture and Hayland, Farmsteads and Riparian areas.

The treatment alternatives were developed using the inventory and the SCS Technical Guide. These alternatives include both structural and management practices. Recommended alternatives for specific resource concerns are selected by on site identification of problems related to soil, water, plants, animals and air within that treatment unit.

Each proposed treatment alternative includes essential practices and practices pending site assessment. Essential practices are practices required to meet the appropriate management system. Practices selected pending site assessment will depend on the environmental conditions, the farmers level of skill and education and how the practice will benefit the overall hydrologic unit area's water quality goal.

Treatment alternatives for each treatment unit will be outlined as the following systems of practices.

Treatment alternative 1 - Resource management system (maximum system)
Treatment alternative 2 - Basic management system (medium system)
Treatment alternative 3 - Alternative management system (minimal system)
Treatment alternative 4 - Future Without Project (existing system)

TREATMENT UNIT - NON-IRRIGATED CROPLAND
This treatment unit is comprised of dry cropland in the Little Bear River HUA with 12 to 18 inches average annual precipitation.

Treatment alternative 1 - Resource Management System on Non-Irrigated Cropland

Essential practices

***** Conservation cropping sequence
* Integrated Pest management
* Nutrient Management
***** Conservation tillage
* Wildlife upland habitat management

Practices pending site assessment

* Chiseling and subsoiling
* Grade stabilization structure
* Cover and green manure crop
* Land leveling/smoothing
* Diversion
  + obstruction removed
  + dike
  + subsurface drain
  + underground outlet
* Terrace
  + obstruction removed
  + subsurface drain
  + underground outlet
* Emergency tillage
* Contour farming cross slope
* Water and sediment control basin
* Grasses and legumes in rotation
* Wetland Habitat Mgt.
* Wetland development
* Grassed waterway
* Sediment basin
* Underground outlet
* Mulching
* Field borders
* Strip cropping
  + obstruction removed
  + wind strip cropping
  + contour strip cropping
  + field strip cropping

Treatment alternative 2 - Basic conservation system on Non-Irrigated Cropland

Essential practices

* Conservation cropping sequence
* Conservation tillage

Practices pending site assessment

* Chiseling and subsoiling
* Grade stabilization structure
* Water and sediment control basin
* Land leveling/smoothing
* Grasses and legumes in rotation
* Diversion
* Terrace
* Strip cropping
* Mulching
* Contour - cross slope farming
* Wildlife upland habitat Mgt.
* Cover and green manure crop
* Wetland development
* Grassed waterway
* Wetland Habitat Mgt.
* Sediment basin
* Underground outlet
* Field borders

Treatment alternative 3 - Alternative management system on non-irrigated cropland

Essential practice
* Conservation cropping sequence

Practices pending site assessment
* Chiseling and subsoiling
* Wildlife upland habitat Mgt.
* Grade Stabilization structure
* Underground outlet
* Wetland development
* Terrace
* Sediment basin
* Cover and green manure crop
* Land leveling/smoothing
* Field borders
* Contour farming
* Diversion
* Water and sediment control basin
* Conservation tillage
* Grassed waterway
* Strip cropping
* Mulching
* Grasses and legumes in rotation
* Emergency tillage
* Wetland Habitat Mgmt.

TREATMENT UNIT - IRRIGATED CROPLAND
This unit is comprised of shallow soils with a slight or moderate erosion hazard.

Treatment alternative 1 - Resource management system on irrigated cropland

Essential practices
* Conservation cropping sequence
* Integrated Pest management
* Nutrient management
* Irrigation water management
* Crop residue use
* Wildlife upland habitat Mgt.

Practices pending site assessment
* Wetland development
* Chiseling and subsoil
* Grasses and legumes in rotation
* Cover or green manure crop
* Irrigation system sprinkler or surface
* Pumping plant
* Filter strip
* Waste utilization
* Field borders
* Irrigation water conveyance
* Contour farming - cross slope
* Waste management system
* Land leveling/smoothing
* Well
* Conservation tillage
* Mulching
* Emergency tillage

Treatment alternative 2 - Basic management system on irrigated cropland

Essential practices

* Conservation cropping sequence
* Crop residue use

Practices pending site assessment

* Irrigation water conveyance
* Irrigation water management
* Chiseling and subsoiling
* Contour farming - cross slope
* Grasses and legumes in rotation
* Wildlife upland habitat Mgt.
* Waste management system
* Cover or green manure
* Well
* Mulching
* Conservation tillage
* Wetland development
* Pumping plant
* Filter strip
* Waste utilization
* Emergency Tillage

Treatment alternative 3 - Alternative management system on irrigated crop land.

Essential practice

* Conservation cropping sequence

Practices pending site assessment

* Irrigation system
* Irrigation water conveyance
* Irrigation water management
* Chiseling and subsoiling
* Contour farming - cross slope
* Grasses and legumes in rotation
* Wildlife upland habitat Mgt.
* Waste management Treatment
* Cover or green manure
* Landleveling/smoothing
* Well
* Pumping plant
* Wetland development
* Conservation tillage
* Crop residue use
* Mulching
* Filter strip
* Waste utilization
* Field borders

TREATMENT UNIT - PASTURE AND HAYLAND

All pasture and hayland involving grasses and forbs. On dryland and irrigated lands

Treatment alternative 1 - Resource management system on pasture and hayland.

Essential practices

* Pasture and Hayland management
* Planned grazing system
* Wildlife upland habitat Mgt.
* Irrigation water management

Practices pending site assessment

* Pasture and hayland planting
* Irrigation system
*Irrigation water conveyance
* Nutrient management
* Integrated Pest management
* Land leveling/smoothing
* Fencing
* Well
* Trough and tank
* Wetland development

* Pumping plant

TREATMENT UNIT - FARMSTEAD
This area is around the homestead, barns, corrals and animal holding facilities

Treatment alternative 1 - Resource management system on farmstead area

Essential practices
* Waste management system
* Waste utilization
* Waste storage

Practices pending site assessment
* Waste treatment lagoon
* Waste storage pond
* Runoff management system
* Subsurface drain field ditch
* Diversion
* Tree planting
* Dike
* Irrigation system
* Farmstead windbreak
* Wetland development
* Grassed waterway or outlet
* Subsurface drain
* Fencing
* Trough or tank
* Filter strips
* Surface drain, main or lateral

TREATMENT UNIT - RIPARIAN AREA

Treatment alternative 1 - Resource management systems on riparian areas

Practices pending site assessment
* Channel vegetation
* Livestock exclusion
* Stream channel stabilization
* Commercial fish ponds
* Dam - multi purpose
* Flood water diversion
* Wildlife wetland habitat
* Fencing
* Lined waterway
* Dam diversion
* Range seeding
* Defer grazing
* Floodway
* Wetland development
* Clearing and snagging
* Streambank protection
* Grade stabilization structure
* Conservation cover
* Fish stream improvement
* Recreation area improvement
* Upland wildlife habitat
* Filter strip
* Open channel
* Grassed waterway
* Dam flood water
* Dike
* Spring development
* Wildlife watering

Fish and Wildlife
The following general outline is the Division of Wildlife Resources preferred direction in habitat protection and improvement for upland ranges

Big Game
Big game winter ranges are defined as normal and critical. Normal ranges define the upper and lower limits of

animals during a normal winter. Critical ranges are what remain of normal ranges when winter snow conditions are severe (snow depths over 18 inches). Typically, critical ranges provide only 15-25 percent of the area available on normal winter ranges. The amount of forage on critical ranges determines the survival of big game, especially deer. The Division opposes any land-use activity which impacts habitat within these areas. Critical ranges are also priority areas for habitat improvement projects. Because normal winter ranges are larger, we can accommodate more competing land uses and generally do not oppose manipulations on north or east slopes or within swells which fill with snow.

Within the Little Bear River Watershed, deer and elk both winter within big sage communities. Although deer forage on bitter brush, serviceberry and mountain mahogany, big sagebrush is essential to their survival. Sagebrush is our key to management species for deer.

The food habits of elk are more versatile. While elk and deer overlap on many sagebrush winter ranges, elk also use higher elevation ridges where they prefer perennial bunch grasses and mountain mahogany.

Moose typically winter within the mountain brush-conifer zone, where they utilize mountain mahogany, serviceberry, oak brush and subalpine fir. Social intolerance scatters moose in such low densities that overgrazing is generally not a problem.

Projects to improve forage and/or cover for big game should first be directed toward improving sagebrush on critical ranges. Management objectives vary with each species and among vegetative communities. Included are general habitat management objectives for the major vegetative communities.

Other Wildlife

Waterfowl can be found on agricultural lands year round. Sandhill Cranes, Blue Herons, and many species of ducks, geese, pheasants, all nest and feed on agricultural land and wetlands in the Little Bear River Watershed.

Fur bearing mammals within the watershed include mink, muskrat, weasel, racoon, beaver, rabbits, bobcat, red fox, bear and mountain lion.

Many predatory birds (raptors) inhabit the area with the largest being the Golden Eagle. The Little Bear River Watershed is the winter home of several species including the Bald Eagle.

Fish

Trout living in streams are influenced very strongly by their environment. A healthy habitat usually means an abundance of trout. Conversely, a stream with deficiencies in one or more key environmental features usually supports fewer trout. Severe habitat degradation often equates with a poor trout fishery (N. Allen Binns, Habitat Quality Index Procedures manual, Wyoming Game and Fish Department, 1982).

Through his research with stream characteristics affecting trout production, Allen Binns designed a methodology to predict a stream's ability to produce trout. He selected nine measurable stream attributes that are rated and plugged into a weighted equation according to it's value for fish production. These nine attributes are:

1. late summer stream flow called critical period flow (CPF)
2. annual stream flow variation (ASFV)
3. maximum summer stream temperature
4. nitrate nitrogen
5. fish cover
6. eroding stream bank
7. substrate
8. water velocity
9. stream width

Binns' methodology was applied to the Little Bear River Hydrology Unit. It makes it possible to calculate expected increased fish production as each attribute is improved.

Within the LBR the lack of adequate water flow below Hyrum Reservoir during the critical period of August and September and the high variation of flow volume through the year, caused a low production prediction of game fish for this location. The actual catch showed a high poundage of game fish produced. However, there were low numbers of game fish caught, the average weight of these fish was high resulting in the high poundage observed. Most fish captured

at this location were non-game fish. The large size and age of the game fish mean they are either produced somewhere else and migrated into this area at high water or there has been low survival of small fish produced in this area for several years (See appendix D Wildlife & Recreation Report for tables and charts).

The flow of water above Hyrum Reservoir is much better, resulting in the prediction and actual poundage of game fish being essentially the same. The actual picture of what is occurring in this area of the river is unclear because fish were chemically removed several years ago. The brown and rainbow trout were restocked but the mountain whitefish, sculpin and mountain sucker have migrated back in. More time is needed before the natural stream will influence fish production.

Recreation

The Little Bear River Hydrologic Unit is recognized by many sportsmen as a multi-user recreational resource. Fishing, hunting (big and upland game), camping, hiking, picnicking, bird watching, canoeing, waterskiing, skiing, cross country skiing, bicycling, and a variety of other recreation uses are common Many recreational opportunities will be enhanced by the use of biotechnical and/or geomorphic river restoration. However, other resources such as waterskiing, picnicking, and bird watching can be improved by proper management and maintenance of the riparian areas within the hydrologic unit.

An example of a maintained riparian area in the Little Bear River Hydrologic Unit is the Birdcreek drainage located near the town of Mendon. The Mayor and some citizens of Mendon have expressed their interest in improving this valuable resource. The Birdcreek stream corridor that runs through the town of Mendon is a Nature Trail that local citizens have improved and maintained. Older majestic cottonwood and willow trees embellish a pleasing streamwalk along Birdcreek. The Birdcreek Streamwalk area is an example of a recreation opportunity within the hydrologic unit.

Powder Mountain ski resort - Nestled high in the spectacular Cache County moutains at the south end of the Little Bear River Watershed, provides some of the finest skiing anywhere. Deep powder snow, a variety of terrain and 33 designated runs provide excellent skiing for everyone.

Recreational Opportunities

Recreation opportunities were discussed often at wildlife and recreation workgroup meetings. Management such as stream maintenance flows can have a direct impact on fishing and river recreation opportunities.

Biotechnical reservoir shoreline protection such as pylon and cribbing stabilization structures to protect eroding toes will enable willow material to establish. It is recognized that willow and other plant material must carefully be selected so that species can tolerate long periods of early seasonal inundation. The same species must have a root system that can tolerate low reservoir levels in mid-summer to autumn. September and August of 1991 willows and cottonwoods were observed growing on the west and south banks of the Hyrum Reservoir despite such harsh conditions.

Since motorboats will continue to utilize the Hyrum Reservoir, erosion from wave action, especially during high water, will continue against the toes of these steep bluffs. Protection will be necessary. This protection could be less costly while soil material still exists between the waterline and the county road on the west bank. The wildlife and recreation workgroup considered the shoreline fishing and aesthetic qualities of willows and cottonwoods to be highly desirable when compared to the more expensive rip rap or concrete rebankment practices.

The recreation opportunities are a relatively untapped resource along the river corridor. Tools such as image sensing and video/photo enhancement, can be used to demonstrate and design improved recreation areas.

INFORMATION AND EDUCATION

Introduction

Within the Little Bear River Watershed approximately 88 percent of the land is privately owned, approximately one-third is in cropland. Many farmers view their role toward the natural resources they manage from the standpoint of stewardship of the land. Stewardship, however, requires knowledge about environmental problems, such as ground- and surface-water contamination, and the adoption of practices that preserve long-term soil productivity and water quality. The effective treatment of NPS ground-water and surface-water pollution in the Little Bear River Hydrologic Unit requires the timely delivery of educational materials and conservation technology.

The LBR hydrologic unit's Information and Education (I&E) work group objective is to attack the problem of NPS water pollution at the local level and use education as a force for increasing understanding and changing current behavior.

Increasing Public Awareness and Cooperation

Many Cache Valley residents take an active interest in the management of our natural resources, among them the water resource ranks very high, perhaps number one. Unfortunately, public understanding of this resource and of the problems surrounding its management is often incomplete, resulting in misperceptions of the issues and complexity involved. Consequently, the Information and Education work group will continue to seek an increased public understanding of the Little Bear River Hydrologic Unit's objectives and the steps necessary to achieve those objectives. Although this task will fall mainly to the I&E work group, contributions from other work groups are needed.

The I&E work group will prepare newspaper articles for release through the local newspapers, as well as working directly with newspaper, radio and television personnel when appropriate. Work group members will continue to produce and distribute the LBR monthly newsletter. They will make themselves available as speakers before civic clubs, organizations, and other public groups whenever possible. Appearances before the County Council, State Legislators and Congressional Delegates are also important and will be pursued. Field trips and tours of the Little Bear River Hydrologic Unit, geared towards increasing the public understanding of the project, will be planned and conducted by the I&E work group.

The Information and Education work group will promote intercommunity cooperation and action by working with community and elected officials to explore options and mobilize community resources. Volunteer assistance in implementing selected practices will also be actively sought and coordinated.

Technology Transfer

Technology transfer in the area of water quality can be a complex issue It involves identifying the water quality problem, compiling information and sometimes developing technology capable of making improvements. Next, one must be able to assess the target audience where this technology mu6t be applied. Often the target audience is unaware of the problem or the technology available to remedy the problem. The target audience requires valid reasons why the technology should be adopted and assistance in adapting the technology. Finally, the impacts of this technology on both the targeted audience and the situation it is designed to address must be assessed.

Many groups, organizations and government agencies are seriously concerned about water quality but their approaches differ. By addressing the water quality issue within the Little Bear River Watershed in a coordinated resource management planning (CRMP) style, the existing problems have been more accurately identified, the occurrence of conflicting messages to the target audiences are being minimized, inaccuracies are being reduced, the scope has been broadened, information is being better coordinated and misinformation is being curtailed dramatically. In this way the hydrologic unit is able to communicate a consistent message to effect needed and acceptable changes.

Within the LBR watershed several methods have been used to improve the communication of technology from researchers to landowners, operators and the general public. Continuing efforts to improve this communication link is an important element of the Information & Education work group's efforts. One means, being used to assist in effectively transferring technology is a Geographic Information System (GIS). In addition to being an effective and accurate means of transferring technology, the GIS provides a rapid means of putting together various planning scenarios, provides accurate measurements of areas and distances and produces impressive visual aids that can be effective tools in helping to gain public and landowner support and participation.

Interactions With Cooperators

Much of the success of the Little Bear River Hydrologic Unit is dependant not only on direct financial support from cooperators but also on their active participation in research and technology transfer. Establishing strong working relationships between researchers, work group members and resource managers is essential for rapid exchange of information. Many individuals within the watershed have developed innovative strategies to deal with problems in resource management. The Information and Education work group will build on this expertise by involving cooperators as speakers on field trips, at workshops, and as contributors to the LBR newsletter. We will also seek advice from cooperators on the objectives, topics and design for research. Cooperators will also be instrumental in providing operational-scale support such as yearly stream channel maintenance.

Active involvement of key individuals and cooperating organizations, helps work group members focus on significant problem areas and increases the application of research results. The development of open communication between these work group members and cooperators will enhance the two-way flow of new information vital to the hydrologic units objectives.

MONITORING AND EVALUATION

Little Bear River Water Quality

The Little Bear River originates high in the Cache National Forest in southern Cache Valley and proceeds north and west through two irrigation/recreation reservoirs, Porcupine and Hyrume The State of Utah has classified this river system for beneficial uses in the categories of cold water fisheries, waterfowl, and agricultural use. Its water quality is relatively high as it leaves the forest but soon deteriorates due to increasing loads of sediment and nutrients. These substances are contributed from various sources including unstable stream bank erosion, agricultural activities, and private trout farm usage of river water. Below Hyrum Reservoir the stream meanders through agriculture and wetland areas until it is joined by Spring Creek a short distance above Cutler Reservoir.

Utah State University, Utah Department of Agriculture, Bear River Health Department, Utah Department of Environmental Quality, Utah Division of Water Rights, USU Extension Service and the USDA Soil Conservation Service are cooperating to provide a diversified monitoring program on the Little Bear River HUA.

Current monitoring and evaluations include:

* Effects of bank erosion on water quality
* Video Remote Sensing and GIS
* Flow and storm event monitoring
* Computer simulation modeling
* Evaluation of BMPs in riparian areas
* Urban vs. Agricultural pollution inputs
* Economics-cost effectiveness of proposed BMPs
* Riparian area evaluation, data collection, monitoring, and classification
* Utah Department of Environmental Quality monitoring

Utah Department of Environmental Quality Monitoring

Historic benthic or macroinvertebrate data have been collected at two sites in the Little Bear River system, west of Avon (490570), and above confluence with Logan River (Cutler Reservoir) at County Road 376 crossing (490500). In general, data indicate the upper sampling site west of Avon is of relatively good water quality, supporting a high diversity of macroinvertebrate taxa including species of Mayflies, Stoneflies, Caddisflies, and other cold water insects. The Little Bear River above the confluence with the Logan River at County Road 376 crossing has a much lower species diversity which may be due in part to an impaired water quality condition. Lack of substrate habitat, warm water conditions, stream bank sloughage and erosion may also contribute to this condition. Cold water macroinvertebrates could possibly inhabit this area at certain times of the year provided the proper substrate condition were present.

The Section 319 water quality monitoring program includes twelve (12) sites including three (3) macroinvertebrate sites. An additional five (5) sites will be set up for monitoring in the Spring Creek subwatershed for 1992, bringing the total to seventeen (17) monitoring sites including the three macrovertebrate sites. Eleven (11) of these sites were sampled in 1990. See appendix A, map 6 for sampling site locations within the hydrologic unit. Water Quality Sites (WQ site#) 1 thou 7 have SCS Water Quality Indicator Guide worksheets completed in 1990.

STORET #	WQ SITE #	DESCRIPTION
*490500	1	Little Bear River above confluence with Logan River
490550	2	Little Bear River upstream of the Island
490565	3	Little Bear River below Hyrum Reservoir
*490566	4	Little Bear River above Hyrum Reservoir (this site was not sampled in 1990-no access)
490567		Little Bear River downstream from White Trout Farm
490568		Whites Trout Farm

490569		Influent to Whites Trout Farm
*490570		Little Bear West of Avon
490574	6	South Fork Little Bear River above confluence with East Fork Little Bear River
490576	7	South Fork Little Bear River above confluence with Davenport Creek
490577	8	Davenport Creek above confluence with South Fork Little Bear River
490578	9	East Fork Little Bear River below Porcupine Reservoir
490490	10	County Road 736 (Mendon Highway) Spring Creek crossing
490492	11	South Fork Spring Creek east of Pelican Pond
490494	12	South Fork Spring Creek at US 89
490499	13	1.3 miles north of College Ward at Hyrum Slough crossing
490487	14	South of Nibley, College Ward Road on Hyrum Slough at old gaging station

Sampling frequency at these sites is semi-monthly during spring runoff, monthly during summer and fall, and bi-monthly during winter. Macroinvertebrate sampling in conducted before spring runoff and in late fall.

Parameters sampled include flow (cfs), total suspended solids (TSS), total phosphorous (TP), total reactive dissolved phosphate (P04), ammonia (NH3), nitrate (N03), nitrite (N02), total inorganic nitrate (TIN), total dissolved solids (TDS), and total coliform.

Total Phosphorous (TP) and total inorganic nitrogen (TIN=NH3+N03+N02) are parameters which indicate the levels of available nutrients in the system, and are thus specific pollution indicators. Levels exceeding N>4 Mg/l or P>0.05 indicate possible degradation of water quality. The ratio N/P indicates whether or not the system is limited specifically by the available nitrogen (N/P<14).

Data obtained from 1990 sampling show peaks of total P at station 490567, downstream from Whites Trout Farm; at station 490550, above the Island; and at station 490500, above the confluence with Logan River. Peak Nitrogen levels occur at station 490567 and at station 490500. Nitrogen limiting is indicated in the upper reaches of the South Fork and in the bottom reaches of the River above Logan River confluence.

In general, impairments to designated uses of the Little Bear River from suspended sediments tend to occur more frequently in the section of the river above Hyrum Reservoir, while impairments to designated uses from nutrients tend to occur more frequently in the section below Hyrum Reservoir. During high runoff periods, however, high sediment and high nutrient values occur in the Little Bear both above and below Hyrum Reservoir.

EDUCATIONAL, TECHNICAL AND FINANCIAL PROGRAM ASSISTANCE

Educational, financial and technical assistance will be provided to farmers, ranchers and foresters in applying new and improved agrichemical and animal waste management practices.

A principal program objective will be to adopt water quality practices to reduce or prevent contamination of ground or surface water by agricultural nonpoint sources where it has been identified. Educational, technical and financial assistance will be provided in the hydrologic unit area to remedy water quality problems. This assistance will help meet federal and state water quality requirements and specific water quality goals of the water quality project.

The necessary assistance will be provided to the agricultural community to restore agriculturally impaired water resources and to prevent future impairments. The effects of these activities on ground-water and surface-water will be evaluated.

A coordinated technology development and application process for water quality management practices will be implemented.

The responsibility for the Education and Technical Assistance (E&TA) activities, rests upon the USDA agencies that have major field delivery capabilities. ASCS will accelerate the installation of conservation practices, that improve water quality through financial assistance and local conservation coordination. ES will provide information and education programs that address the selection and application of agricultural

chemicals. SCS will provide technical assistance for project planning and the development, installation and evaluation of conservation practices for improving and protecting water quality. EPA will provide financial assistance through state agencies to the Bear River RC&D Council for implementation, technical assistance and management under Section 319 of the Water Quality Act of 1987.

SCS, ES and cooperating agencies will provide conservation planning and technical assistance that will help farmers and ranchers to meet State Water Quality goals without undue economic hardship. ASCS and EPA will provide financial assistance to producers for installing water quality practices.

Program funds are reserved by ASCS at the national level to fund Water Quality special projects such as the Little Bear River HUA. Various conservation measures authorized under the ACP are available to solve the problems identified in the project plans. Additional funding will be provided by EPA to address the water quality needs of stream, streambank and animal waste management. Educational & technical assistance will be provided by ES and SCS.

Financial Assistance

Scoping, planning, and establishing cost share priorities are inseparable. People are the resource needed to implement water quality practices and resource management systems. Thus it is proposed that the ASCS, EPA, and any other potential private or public sector sponsors who have a vested interest, focus their financial assistance towards landoperators who want to address identified and verifiable resource problems. Furthermore, when these resource problems are consistent with the findings of the 1991 Little Bear River Hydrologic Unit Plan, this helps set a priority for Financial assistance. For this purpose a priority rating system was developed and can be found in appendix E.
It is understood that many landoperators may request financial assistance for practices with marginal or no water quality benefits. There will also be many cases where management not structural practices are the proper and most cost effective tool. Some examples of this are; integrated pest management, stubble mulching, proper disposal of pesticide containers, practices that may affect groundwater and the movement of chemicals in and through the soil. In most of these cases a strong information and education program can be effective. For this purpose information and education programs have been wisely targeted in the Little Bear River Annual Plan of Operation for the duration of the project.

The Technical Advisory and Steering Committees have made the decision that resource management systems receive higher priority for financial assistance than single practices. The system needs to be complete in order to address a long term resolve to solve water pollution problems. For example, instead of completing a single streambank erosion practice for an operator whose livestock depend on the river as a water source, the priority should be directed to the manager who wants to develop a grazing management system with proper grazing utilization, fence critically eroded areas needing protection, and develop an alternative watering source that would rest the river channels and streambanks from unnecessary trampling.

Another recommendation for setting financial assistance priorities would be pooling agreements (several landowners together) over individual contracts. Many riverfront property owners made this point numerous times. What one river landowner does upstream from another individual will have either a positive or negative effect on downstream neighbors. For this reason it is important for agencies and individuals involved to understand why pooling agreements become even more interdependent than traditional type cooperative cost sharing. Most of the long term benefits of water quality improvements will be offsite.

The immediate or short term return-on-investment is not there for the landoperator who is interested in water quality improvements. However, all downstream users are benefactors of these improvements.

LITTLE BEAR RIVER HYDROLOGIC UNIT AREA
EDUCATIONAL AND TECHNICAL ASSISTANCE ESTIMATED BUDGET
(ES/SCSI EPA)

	1992	1993	1994
1. Information and Education (ES)	$65,000	$65,000	$65,000
Subtotal ES/USDA Funding	$65,000	$65,000	$65,000
2. Technical Support (SCS)	$150,000	$150,000	$150,000
Subtotal SCS/USDA Funding	$150,000	$150,000	$150,000
E&TA TOTAL	**$215,000**	**$215,000**	**$215,000**

LITTLE BEAR RIVER HUA GRANT/COST SHARE NEEDS

	1991	1992	1993	1994
FUNDING FROM ASCS FOR ACP	* $150,000	$150,000	**$150,000	**$150,000
FUNDING FROM EPA-319 (applied for/needed)	$75,000	*1*$300,000	*1*$200,000	*1*$33,400
Subtotal	$225,000	$450,000	$350,000	$183,400

* ACP money allocated through planning FY91
** Money needed ACP funds to reach goals
1 EPA - 319 funding request

Estimated funding need from ASCS	$600,000
Estimated funding need from EPA	$608,400
Subtotal Cost Share Funds	$1,208,400

Cooperators		
In kind, estimated EPA cost share matching	40%	$250,000
Estimated ASCS cost-share matching	25%	$150,000
Subtotal Cooperators Cost		$400,000
Subtotal Implementation Cost		$1,608,400
Subtotal Educational, Technical, Administrative		$825,000

TOTAL PROJECT COSTS $2,433,400

STREAM CHANNEL RESTORATION

There are approximately 20 miles of stream channel between Porcupine and Cutler Reservoir which has been de-stabilization as a result of the 1983-84 flood events. There is need for some streambank and stream channel stabilization work which will required the use of heavy equipment and placement of rock structures. EPA 319 funding for this demonstration project will be directed toward this BMP[3]s and would be

administered by the Blacksmith Fork SCD. OFF Stream funding will be with the ASCS, ACP program.

TOTAL amount of stream Needing Restoration	AVERAGE estimated amount per foot for restoration	TOTAL COST
20 miles--211,200 feet (40 miles both banks)	$1.00 per linear foot	$211,200.00
	75% TOTAL COST SHARE	$158,400.00

ANIMAL WASTE MANAGEMENT

All of the BMP's for Animal Waste Management will be considered and installed as need to control the waste.

There are approximately 100 feedlots, and dairies in the watershed. The ASC County Committee, and the Blacksmith Fork SCD will prioritize these areas according to severity of problems. Seventy-five percent of the feedlots need animal waste control measures to meet water quality improvement goals of the project. Costs will vary according to the number of animal units in each feedlot. An average cost of $20,000 per agricultural waste management system has been determined.

EPA 319 funding will be used to install the BMP's associated with the Agricultural Waste Management Systems.

		Critical Needing Treatment		
Total feedlots/dairies	Treatment	75% Most Severe	Cost	TOTAL
100	40	30	$20,000	$600,000
		75% Cost Share rate		$450,000

COST SHARE NEEDS

Cost-share rates have been developed by the ASCS-County Committee and the Blacksmith Fork SCD. Cost Share Rates for the Water Quality Program are higher than the regular ACP, except SP-10, because of the water quality program.

EPA Cost-Share Rates for all streambank, instream and animal waste will be at 75% with in-kind match.

ACP SCS PRACTICE CODES WATER QUALITY COST SHARE PROGRAM ASCS EPA

NEPA COMPLIANCE

Compliance with NEPA

Alternative actions proposed in this plan are covered in the Soil Conservation Service National Program for Soil and Water Conservation, 1982 Final Program Report and Environmental Impact Statement. Specific actions will be implemented through individual or group conservation plans. In compliance with NEPA and SCS policy, SCS will prepare site-specific environmental evaluations (EE) before actions proposed in this plan are implemented. The EE will identify mitigation needed to reduce or eliminate adverse impacts, or the need for an Environmental Assessment (EA) or Environmental Impact Statement (EIS) to assess the impacts of implementing a proposed action. As appropriate, these EE's will be documented in landowner/operator or group conservation plans.

The control of airborne dust and pollution are addressed in the Utah Air Conservation Regulations R446-l. SCS will address these requirements by designing projects to comply with R446-l.

Utah SCS has an established policy for compliance with the National Historic Preservation Act (NHPA) of 1966 as amended, the Archaeological Resource Protection Act (ARPA) of 1979, and the American Indian Religious Freedom Act (AIRFA) of 1978. This policy will be adhered to when implementing any proposed action.

APPENDICES

APPENDIX A - Maps

APPENDIX B - 8coping Charts

APPENDIX *C* - Couittee and Work Group Mezibers APPENDIX D - Work Group Reports

APPENDIX A - Maps
Map 1 - Location
Map 2 - Cropland Map 3 - Monitoring
Map 4 -Subwatersheds Map 5 - PSIAC & River Classification
Map 6 - Range Sites